

SEQUENCE LISTING

<110> SAPPORO BREWERIES LTD.

<120> Barley Lipxygenase-1 Gene, Selection Method for Barley, Materials for Malt alcoholic beverages and Method for Production of Malt alcoholic beverages

<130> FP04-0052

<150> JP 2003-083924

<151> 2003-03-25

<160> 11

<170> PatentIn version 3.1

<210> 1

<211> 240

<212> DNA

<213> Hordeum vulgare

<400> 1

```
ctcgccaagg cctacgtcgc cgtcaatgac tccgggtggc accagctcgt cagccactgg      60
taoattctcc acggtcgatg tgattcagtc agtcgatgca caacaactga tcgaaatatt      120
attgattgaa acgcgcaggc tgaacactca cgcggtgatg gagccgttcg tgatctcgac      180
gaaccggcac cttagcgtga cgcacccggt gcacaagctg ctgagccgcg actaccgcga      240
```

<210> 2

<211> 240

<212> DNA

<213> Hordeum vulgare

<400> 2

```
ctcgccaagg cctacgtcgc cgtcaatgac tccgggtggc accagctcgt cagccactga      60
taoattctcc acggtcgatg tgattcagtc agtcgatgca caacaactga tcgaaatatt      120
attgattgaa acgcgcaggc tgaacactca cgcggtgatg gagccgttcg tgatctcgac      180
gaaccggcac cttagcgtga cgcacccggt gcacaagctg ctgagccgcg actaccgcga      240
```

<210> 3

<211> 24

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 3

```
ggagaggagg ccaagaacaa gatg      24
```

<210> 4

<211> 19

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 4

```
ggttgcgat ggcttagat      19
```

<210> 5

<211> 21

<212> DNA

<213> Artificial

<220>

<223> primer

<400> 5
 cacgtgcgcg tccgatccat c 21

<210> 6
 <211> 20
 <212> DNA
 <213> Artificial

<220>
 <223> primer

<400> 6
 ccatcacgca gggcatcctg 20

<210> 7
 <211> 20
 <212> DNA
 <213> Artificial

<220>
 <223> primer

<400> 7
 gcgttgatga gcgtctgccg 20

<210> 8
 <211> 24
 <212> DNA
 <213> Artificial

<220>
 <223> primer for LOX-1 with BamHI site

<400> 8
 ggatccatgc tgcctgggagg gctg 24

<210> 9
 <211> 25
 <212> DNA
 <213> Artificial

<220>
 <223> primer for LOX-1 with HindIII site

<400> 9
 aagcttttag atggagatgc tgttg 25

<210> 10
 <211> 2668
 <212> DNA
 <213> Hordeum vulgare

<400> 10
 atgtgtctgg gagggctgat cgacaccctc acggggggcga acaagagcgc ccggctcaag 60
 ggcacgggtg tgctcatgcg caagaacgtg ctggacctca acgacttcgg cggcaccato 120
 atcgacggca tcggcgagtt cctcggcaag ggcgtcacct gccagcttat cagctccacc 180
 gccgtcgacc aagacaacgg cgtgcgggg aaggtggggc cggaggcggg gctggagcag 240
 tgggtgacga gcctgcctgc gctgacgacg ggggagtcca agttcggcct caccttcgac 300
 tgggaggtgg agaagctcgg ggtgcgggg gccatcgtcg tcaacaacta ccacagctcc 360
 gaggttcctgc ttaaaacat caccctccac gacgtcccg gccgcagcgg caacctcacc 420
 ttctgcgcca actcatggat ctaccccgcc gccaaactacc gatacagcgg cgtcttcttc 480
 gccaacgaca cgtacctgcc gagccagatg ccggcggggc tgaagccgta ccgcgacgac 540

gagctccgga acctgcgtgg cgacgaccag cagggcccgt accaggagca cgaccgcato 600
taccgctacg acgtctacaa cgacctoggc gagggccgoc ccatcctcgg cggcaactcc 660
gaccaccctt acccgccgog cggccgcacg gagcgcaagc ccaacgccag cgaccogago 720
ctggagagcc ggctgtcgt gctggagcag atctacgtgc cgcgggacga gaagttcggc 780
cacctcaaga cgtccgactt cctgggctac tccatcaagg ccatcacgca gggcatcctg 840
ccggccgtgc gcacctacgt ggacaccacc cccggcogagt tgcactcctt ccaggacato 900
atcaacctct atgagggcgg catcaagctg cccaaggtgg ccgccctgga ggagctccgt 960
aagcagttcc cgctccagct catcaaggac ctccctcccg tcggcggcga ctccctgctt 1020
aagctccccg tgcgccacat catccaggag aacaagcagg cgtggaggac cgacgaggag 1080
ttcgacggg aggtgtctgc cggcgtcaac cgggtcatga tcacgcgtct caggagttc 1140
ccgccaaaaa gtagtctgga cctagcaag ttgtgtgacc acaccagcac catcacggcg 1200
gagcacatag agaagaacct cgagggcctc acggtgcagc aggcgctgga aagcaacagg 1260
ctgtacatcc ttgatcacca tgaccggttc atgcggttcc tgatcgacgt caacaacctg 1320
cccggaact tcatctacg cagcaggacc ctctcttcc tgcgcggcga cggcaggctc 1380
acgcccgtcg ccatcgagct gagcgagccc atcatccagg gcggccttac caggccaag 1440
agcaaggttt acacgccgtt gccagcggc tccgtcgaag gctgggtgtg ggagctcgc 1500
aaggcctacg tcgcccga tgactccggg tggcaccagc tgcagacca ctgatacgtt 1560
ctccaaggtc gatgtattc agtcagtga tgcacaaca ctgatcgaaa tatgattgat 1620
tgaacgcgc aggtgaaca ctacgcggt gatggagccg ttctgtatct cgacgaaccg 1680
gcacctagc gtacgcacc oggtgcacaa gctgtgagc ccgcactacc ggcacacct 1740
gacctcaac gcgttgggc ggcagacgt catcaacgc gccggcatct tcgagatgac 1800
ggtgttccg ggaagtgc cgttggggat gtcggccgtg gtgtacaagg actggaagtt 1860
caccgagcag ggactgcgg acgatctcat caagaggggc atggcggtg aggacccgtc 1920
gagcccgta aaggtgcgt tgcgtgtgc ggactacccg tacgcggcgg acggcgctgg 1980
gatctggcag gccattgag agtacgtgag cgagtacct gccatctact acccgaacga 2040
cggcgtgctg cagggcgata cggaggtgca ggcgtgttg aaggagacgc gcgaggtcgg 2100
gcacggcgac ctcaaggac cccatgggt gcccaagatg caaagtgtg cggagctggc 2160
caaggcgtgc accaccatca tctggatcg gtcggcgtg catgcggcag tcaacttcg 2220
gcagtacccc tacgcgggtt tctcccgaa cggccgacg gtgagccggc gccgcattgc 2280
ggagccggc acggaggagt acgcggagct ggagcgcgac cggagcggg ccttcatcca 2340
caccatcacg agccagatcc agaccatcat cggcgtgtc ctgttgagg tctgtcgaa 2400
gcactcctcc gacgagctgt acctcgggca gcgggacacg ccggagtga cctcggacco 2460
aaaggccctg gagggttca agcgggtcag cgaccgctg gtggagatcg agagcaaggt 2520
ggtgggcatg aacctgacc cggagctcaa gaaccgaac ggcccggtc agtttcccta 2580
catgtgtctc taccacaaca cctccgacca caaggcgcc gctgcgggga ttaccgcaa 2640
gggcatcccc aacagcatct ccatctaa 2668

<210> 11
<211> 4393
<212> DNA
<213> Hordeum vulgare

<400> 11
 cacgtgccc tccgatccat ctctccaaag ccgagcgcca caccaccggg accggaccgg 60
 gaccggccta taaattgccc ggaccgagct gcaagcagct cctcacacac actcacgcaa 120
 cacacatcca ttttcaactga aaagtgaata acagtggtgt ggtgccattg gttggagcag 180
 tgaaagcgag gagaggaggg caagaacaag atgctgctgg gagggctgat cgacaccctc 240
 accggggcga acaagagcgc ccggctcaag ggcacgggtg tgcctatgcg caagaacgtg 300
 ctggacctca acgacttcgg cgccaccatc atcgacggca tggcgaggtt cctcggcaag 360
 gggtcacct gccagcttat cagctccacc gccgtcgacc aaggtaatca ctaccctcct 420
 ccggccttct cctctgttta caagatatag tatttcttct gtgtggggcg gggccatgg 480
 atggatggat gtgtctggat cggctaaaga agataggata gctagccctg gccggtcgtc 540
 tttaactgag catgggcata tgccatcgaa aaaagagaca acagcatgca tgcattggtc 600
 ggcaccaga ccacgcagag caccggatgc tcgagacaaa gcaacacaa aagcaaggac 660
 gacacgtcaa aagcaacaca acaagcaagg accgcacgtc aaaagcaaca caaacctaaa 720
 ctaaagcaca aagacgtaag agcaagcaca caatcagcag gctataaaca gttgtcatca 780
 aaaacaacgc tggaagagag agagaaggaa ggaagtagta gccatgaaaa attaatcac 840
 cgggggttgc tctttgccca acaattaatc aagcagggtc cgtggcatgt atagtcttg 900
 taagtaaaact aagcatgtga tatgagaagg tacgtggtgg tgcagacaa gccggtcgg 960
 ggaaggtggg cgggaggcg gagctggagc agtgggtgac gagcctgcg tcgtgacga 1020
 cgggggagtc caagtccgc ctcaccttcg actgggaggt ggagaagtc ggggtgcgg 1080
 gcccatcgt cgtcaacaac taccacagct ccgagttcct gcttaaaacc atcaccctcc 1140
 accaggtccc cggccgcgc ggcaacctca ccttcgtcgc caactcatgg atctacccc 1200
 ccgccaacta ccgatacagc cggctcttct tcgccaacga cgtgcgtgga ttttctcta 1260
 ctttctctc ctttcatttt caccgccttc gtcattcatg gtgatcatt aagtcttgc 1320
 aggacaatag atgatgagct aggagtgtt accacttagc agtacgtaca ttatttatto 1380
 cgtgttgga gaaaaggata tggtttggtg cagatcgaca caagattgaa tgaaagtgc 1440
 accgtggcac cgtggcagcg tggtaggtga aaataactgt tgcacggatc caccacatg 1500
 attgttttca tgaataaaact ttttaaggat gtgtctagcc acatctagat gcatgtcaca 1560
 taattattgc ataccaaaac gattaaatta agcataaaaa gaaaaggaaa aaaatactca 1620
 catatctga cgtaagatca atgatatagt attagatat gcaatattta ttttacctt 1680
 aaacctttct tcatctctaa atataagaca ttgttaagat ttactatgg acaacatag 1740
 aaacaaaatc agtggatctc tctatgcatt cattatgtag tctataataa aatctttaa 1800
 agatcgtata ttttgcaacg gagggagtaa aacataactt tttaatagta atgttgacg 1860
 gctccacact cgcagacgta cctgcgcgag cagatgccgg cggcgtgaa gccgtacgc 1920
 gacgacgagc tccggaacct gcgtggcgac gaccagcagg gccgtacca ggagcagac 1980
 cgcatctacc gctacgacgt ctacaacgac ctggcgagg gccgcccct cctcggcggc 2040
 aactccgacc acccttaccg gccgcggcg cgcacggagc gcaagcccaa cgcagcgac 2100
 ccgagcctgg agagccggct gtcgtgctg gagcagatct acgtgcgcg ggacgagaag 2160
 ttggccacc tcaagacgtc cgaacttcgt ggctactcca tcaaggccat cagcagggc 2220
 atcctgccgg ccgtgcgcac ctacgtggac accacccccc gcgagttga ctccttcag 2280

gacatcatca acctctatga gggcggcatc aagctgccc aagtgccgc cctggaggag 2340
ctccgtaagc agttcccgt ccagctcacc aaggacctcc tcccgtcgg cggcgactcc 2400
ctgcttaagc tcccgtgcc ccacatcacc caggagaaca agcaggcgtg gaggaccgac 2460
gaggagtgc caccggagggt gtcgcccgc gtcaaccgg tcatgatcac gcgtctcacg 2520
gtgagtcagc gattatttgt tcattgtgtg tgtatggtgt ccatggtgag aaagtgcaga 2580
tcttgatttg cgttgggtcg catgcacgca tgcgtcatgc atgcaggagt tcccgccaaa 2640
aagtagctcg gaccctagca agtttggtga ccacaccagc accatcacgg cggagcacat 2700
agagaagaac ctcgagggcc tcacgggtga gcaggtaatt ggtccaagcc atcgacatca 2760
actatgattt acctaggagt aatiggtagc ttagataat ttggcttcgt tgcaattaat 2820
ttgatgctgg ccgatcaagt gatcgtattg ggtttgaaat ttgcaggcgc tggaaagcaa 2880
caggctgtac atccttgatc accatgaccg gtcatgcgc ttccgtatcg acgtcaacaa 2940
cctgcccggc aacttcactc accccacgag gacctcttc ttccgtcgcg gcgaaggcag 3000
gtcacgcgcg ctccgcatcg agctgagcga gcccatcacc caggcgggcc ttaccacggc 3060
caagagcaag gtttacacgc cgttgcccag cggctccgtc gaaggctggg tgtgggagct 3120
cgccaaggcc tacgtgcgcg tcaatgactc cgggtggcac cagctcgtca gccactgata 3180
cgttctccac ggtcgtatgt attcagtcag tcgatgcaca acaactgac gaaatatgat 3240
tgattgaaac gcgcaggctg aacactcacg cgtgatgga gccgttcgtg atctcgacga 3300
accggcacct tagcgtgacg caccgggtgc acaagctgct gagcccgcac taccgcgaca 3360
ccatgacct caacgcgtg gcgcggcaga cgtcatcaa cgcggcgccc atcttcgaga 3420
tgacgggtgt cccgggcaag ttgcggttg ggatgtcggc cgtggtgtac aaggactgga 3480
agttcacga gcaggagctg ccggacgac tcatcaagag gtacgtacct ggtaaattgt 3540
atgaatgtgt aaaacaaatt gggcgtctcg ctactgaca ggaacgtgt aaaaaaatg 3600
caggggcatg gcggtggagg acccgtcgag cccgtacaag gtgcggtgc tgggtgcgga 3660
ctaccgtac gcggcgacg ggtggcgat ctggcacgcc attgagcagt acgtgagcga 3720
gtacctggcc atctactacc cgaacgacg cgtgctgcag ggcgatacgg aggtgcaggc 3780
gtggtggaag gagacgcgcg aggtcgggca cggcgacctc aaggacgccc catggtggcc 3840
caagatgcaa agtgtccgg agctggccaa ggcgtgcacc accatcatct ggatcgggtc 3900
ggcgtgcat gcggcagtca acttcgggca gtaccctac gcggggttc tccgaaccg 3960
ggcgacggtg agcggcgccc gcgtgcgga gcccggcacg gaggagtacg cggagctgga 4020
gcgcgaccg gagcgggcct tcattcacac catcacgagc cagatccaga ccatcatcgg 4080
cgtgtcgtg ctggagggtc tgtcgaagca ctctccgac gagctgtacc tcgggcagcg 4140
ggacacgccg gattggacct cggacccaaa ggccctggag gtgttcaagc ggttcagcga 4200
ccggctggtg gagatcgaga gcaagggtgt gggcatgaac catgaccgg agotcaagaa 4260
ccgcaacggc ccggctaagt ttccctacat gctgctctac cccaacacct ccgaccacaa 4320
gggcgcgcgt gccgggctta ccgccaagg catccccaac agcatctcca tctaatttaa 4380
gccatcgga acc 4393